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R.A. Kordenat

The Occurance Of Hemolytic Streptococci
About The Teeth.

THE OCCURRENCE OF HEMOLYTIC STREPTOCOCCI
ABOUT THE TEETH

BY

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY
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THE
OCCURRENCE OF HEMOLYTIC STREPTOCOCCI
ABOUT
THE
T E E T H

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The Occurrence of Hemolytic Streptococci

About the Teeth.

Various investigators have shown that hemolytic streptococci occur in the normal as well as in the pathological oral cavity and upper respiratory tract. The object of the investigative work recorded here is to determine the frequency of various hemolytic streptococci about the teeth and gums in apparently normal and in pathological cases.

Literature

Davis (1&2) has shown that hemolytic streptococci occur in the crypts practically constantly and upon the surface in sixty per cent of all tonsils.

MacLay (3) found in 268 cases fourteen strains of hemolytic streptococci in the crypts of tonsils. His examinations show a marked seasonal variation, streptococci being fewer in the summer months. Voight (4) found that thirty per cent of all cases of severe infection of the middle ear, ethmoids and mastoids are due to some form of hemolytic streptococci and that these organisms occur in eighty per cent of tonsils removed. He has isolated hemolytic streptococci

from the urine of patients suffering with an acute tonsillitis. Nichols and Bryan (5) have shown that a high percentage of their tonsil infections is due to streptococci and confirm Davis' (6) observations that they may occur in great numbers in the crypts of tonsils, even when surface smears fail to reveal the organisms. Henrici and Hartzell (7) believe that mouth streptococci are the true parasitic organisms of the mouth because they are the only ones that can live on the clean mucous membrane before eruption of the teeth. They observed that there is a relative decrease, but an absolute increase of these streptococci in conditions of uncleanness and decay. They also believe the organisms in question to be the cause of dental caries, pulpitis and pyorrhea alveolaris because; first, they are the only organisms in these lesions that are pathogenic as exhibited by their local invasive power, their ability to invade the blood and lymph stream and produce metastatic infection; second, they are the only organisms found in the deep advancing borders of infected tissue; third, in metastatic abscesses and in experimental inoculation of animals the organisms produce a subacute and granulomatous lesion similar to the inflammatory reaction found in pyorrhea and chronic apical abscesses; fourth, that the true mouth streptococci (*Streptococci salivarius*) - which, according to Holman's classification is of the non-hemolytic variety -

will invade the dental pulp and peridental tissue. In a later work Henrici and Hartzell (8) have frequently found hemolytic and non-hemolytic streptococci in dental pulps in cases of both dental caries and pyorrhea.

The evidence that streptococci are exciting factors in the etiology of many mouth lesions and that their occurrence in the oral cavity as active foci of infection responsible for many systemic conditions has been further established by Rosenow (9), Babcock (10), Lescohier (11), Eldridge (12), Earl (13), Grieves (14), Potter (15) and others. Rosenow, in his extensive studies on elective localization, lays much stress upon the importance of anaerobic cultures in maintaining the elective localization property of the bacteria.

European workers differ from the majority of American investigators as to the exciting cause of pyorrhea alveolaris. Euler (16) believes pyorrhea alveolaris to be a spirochetosis, caused by the "spirocheta pyorrhoeica" and influenced in some way by *Bacillus fusiformis*, which is normally present in the mouth, but is not pathogenic unless abundant. Intensive arsenical (salvarsan) treatment with proper oral hygiene often produces beneficial results. Dufourmentel and Frisson (17) reported two cases of mouth injuries resulting in a hypertoxic

cellulitis of the neck, phlebitis of systemic, cranial and facial veins and a third resulting in a septicemia with no anatomic change. They recovered a long anaerobic bacillus, similar to the *Bacillus bellonenses* of Saccage's, that produced a fatal edematous septicemia in guinea pigs. They apparently did not meet with hemolytic streptococci in these cases.

From a review of the above mentioned literature it is to be noted that no work has been done on the occurrence of hemolytic streptococci about the teeth and gums.

General Anatomy of Teeth and Gums.

A tooth consists grossly of the corona dentis or crown with its tuberculae or cusps, the colum dentis or neck and the radix dentis or root. (Figure 1) The detailed histology need not be considered here. The roots of the teeth are embedded in the alveoli; to which they are accurately adopted and firmly united by a highly vascular layer of connective tissue, the periostium alveoli (27). The periostium alveoli is continuous with the gums and attached to both the root of the tooth and the alveolus. This attachment is so accurate and firm that the tooth is securely bound to the alveolus preventing any separate movement that will cause undue stress and strain upon the nerves and vessels entering the apex. The gingiva, however, is not always in close

approximation with the root of the tooth, but forms a free circular fold about the crown. It was from these spaces that the material, to be examined for the presence of hemolytic streptococci was collected. The procedure of collecting this material will be described later.

The blood supply of the periosteum alveolare is in part from those arteries which subsequently enter the apical foramina of the roots and in part from the gums. The lymph vessels from the gums drain the periosteum alveoli and terminate in the submental, submaxillary, buccinator and superior deep cervical glands. Noyes and Dewey, (29) by injecting certain dyes, have quite definitely established the existence of lymphatics in the dental pulp. It is thought that those of the mandibular teeth end in the submaxillary and deep cervical glands. Those lymph vessels of the maxillary teeth pass partly by way of the infra-orbital canal to the face, where they join the vessels from the lateral part of the eyelids and terminate in the anterior auricular and submaxillary glands.

Collection of Material

Cultures were obtained from 144 dispensary and hospital patients in the following manner. At the time of collecting the material from these patients, the presence or absence of pyorrhea, gingivitis, the general

condition of the teeth, and wherever possible, the clinical diagnosis were noted and recorded (Table 1).

Wooden applicators (see Figure 2) were sharpened to a fine point and sterilized by means of steam. Five millimeter glass tubing was cut in pieces fourteen centimeters long and one end sealed. These tubes were then filled half full of ordinary dextrose broth, the wooden applicators inserted and the tubes then sealed with cotton plugs. These were then sterilized twice in the autoclave.

The sharpened end of the wooden applicator was then inserted into the space between the tooth and the free margin of the gums. From here one can, in nearly all cases, obtain a large amount of septic debris which clings to the end of the sharpened point of the applicator. The gums were in no case injured in obtaining this material as the fine-pointed end of the wooden applicator was softened by the broth. For this reason it could be inserted quite deeply into this dento-gingival space and is, therefore, considered more practicable than a platinum needle which, when here used, invariably produces pain and bleeding. After the wooden point had been deeply inserted between the gum and tooth it was replaced in the glass container half filled with nutrient broth and incubated at 37° C. for eighteen hours. Then sub-cultures were made from the broth.

Method of Culturing

Serum broth and blood agar plates were inoculated from the initial broth cultures. Only those colonies with hemolytic zones were examined and from these the hemolytic streptococci were isolated and studied.

The growth of hemolytic streptococci in no instance was very abundant, often there being only two or three colonies upon the plates where a loopful of the initial broth (eighteen-hour) culture was made. Thus the cultures differ markedly from those made from material taken from the crypts of tonsils, which in most cases gives an almost pure culture of hemolytic streptococci and often in large numbers.

From the 144 patients examined 28 (19.4 per cent) were positive for hemolytic streptococci (Table 1). In one case two distinctly different strains were obtained in the same patient (Table 2). One strain fermented mannite and not lactose or salicin, while the other fermented lactose but not mannite or salicin.

Morphology

The twenty-eight strains were isolated in pure culture and studied. After the blood agar plates had been incubated at 37° C. for twenty-four hours, the colonies of streptococci were removed with a wire loop

and blood agar slants and tubes of serum broth inoculated. Smears were made from the twenty-four-hour serum broth cultures and the morphology of the organisms observed. They are round cocci about one micron or less in diameter, arranged in chain formation and vary slightly in size. Often they occur singly. Frequently the cocci appear pressed together, especially in blood agar cultures. Lance-shaped cocci have been noted. These are smaller than the typical pneumococci and there is not a definite capsule.

Staining Properties

All strains stain well with the ordinary dyes and are Gram positive.

Classification

by

Fermentation Tests

The twenty-nine strains of hemolytic streptococci (representing twenty-eight positive cases) were classified according to the fermentation reactions advocated by Holman (18). After inoculating infusion broth with *Bacilli coli*, it was then incubated for forty-eight hours, sterilized on two alternate days in the autoclave and then filtered through cotton. To separate

portions of this sugar-free broth lactose, mannite and salicin were added. This broth was then tubed, litmus added and sterilized. Tubes were inoculated with each of the twenty-nine strains of the organisms and one cc of blood serum added to each. The results are recorded in Table 2 and 3.

There were seventeen strains of streptococci anginosus. This organism hemolyses blood and ferments lactose, but it does not ferment mannite, salicin and inulin. Holman found this organism prevalent in nose and throat infections, especially in scarlatinal and measles throats. They have also been found in endocarditis.

Five strains of Streptococcus subacidus were isolated. These are hemolytic but do not ferment any of the carbohydrates mentioned. These, too, are often found in the throat, also in joint and mastoid infections.

Streptococcus hemolyticus I was present in three cases. This streptococcus gives hemolysis and ferments lactose and mannite, but not salicin. It is a comparative rare strain.

There were two strains of Streptococcus pyogenes. This organism hemolyses blood and ferments lactose and salicin. This strain of hemolytic streptococcus is also frequently associated with throat infections. It is the common hemolytic streptococcus found in pyogenic conditions where the streptococcus is the exciting

etiological factor.

Streptococcus hemolyticus II was not found. The *Streptococcus hemolyticus* III was found in one instance; it is a hemolytic streptococcus that ferments only mannite. Holman found it in empyema and in the blood of puerperal sepsis.

One strain of *Streptococcus infrequens* was found. It is a hemolytic streptococcus that ferments lactose, mannite and salicin. This is also a comparatively rare organism and is usually found in throat conditions. Ruediger (19) isolated it from otitis media, pericardial fluid, suppurative adenitis and conjunctivitis. Holman describes a case of chronic arthritis where this streptococcus was harbored in the tonsils and after removal of the tonsils the symptoms improved.

The hemolytic streptococcus equi was not found among the twenty-nine strains.

Virulence

Generally the virulence of hemolytic streptococci varies considerably. Passage through animals increases the virulence, while continued growth on artificial media reduces the virulence. The cell substance possesses little toxicity (19). The

cells yield a streptolysin that hemolyses blood cells - a true toxin containing a haptophore and a toxophore group which, upon injection, will produce specific antibodies (20-21). This hemolytic substance, however, is not the dangerous endotoxin of the streptococci. In 1918 Clark and Felton (23) produced a filterable, non-hemolytic streptococci which would kill rabbits in doses of 0.5cc per 1000 grams of body weight of the rabbit. This work has not been confirmed.

Eleven rabbits were each injected intravenously with 2cc of twenty-four-hour serum broth cultures of the hemolytic streptococci. These were selected at random. Of the eleven strains used, two proved to be fatal (Table 4). One of the rabbits (No. 2) died four days after inoculation. The lung was found hemorrhagic; otherwise there was no anatomical change. The organisms were not recovered from the body fluids. This was believed to be due to faulty incubation. The second rabbit died ten days after injection of the organisms. There were no swollen joints; the lung was hemorrhagic and the organism was recovered from the hearts, blood and bile, but not from any joint. Nine of the rabbits remained alive showing no ill effects with one exception. Rabbit No. 10, which was injected with a strain of streptococcus pyogenes, had distinctly swollen and painful joints.

It is to be noted that only two strains were fatal to the rabbits. The pathogenicity of hemolytic

streptococcus is variable for different animals. Rabbits and mice as a rule are quite susceptible. It is known, however, that strains of streptococci are being passed through one animal, thus increasing the virulence, will not be so highly virulent for another species (23). Some varieties of hemolytic streptococci (those often found in mastitis in cows) may be of low virulence for rabbits, though the organisms themselves are markedly hemolytic (24). Animal tests may not, therefore, be a reliable index of the virulence or pathogenicity for man..

Discussion

It has frequently been shown that hemolytic streptococci occur in various parts of the body, as upon the tonsils, in the crypts of the tonsils (26), the hairy parts of the bodies of filthy individuals (25), the ethmoid and mastoid cells (4), in carious teeth and apical abscess (7 and 8), the appendix (26) and in various other localities without producing acute clinical manifestations. In other words these localities may be considered as frequent habitats for hemolytic streptococci.

Because of the fact that the gingival space (between the gingivae and the teeth) is anatomically suitable for the collection of debris and because of

the above experimental data, it is reasonable to suppose that the gingival space may occasionally act as a focus of infection. In the 144 cases examined fewer hemolytic streptococci were found about those teeth and gums to which a tooth brush had been recently applied. The majority of the individuals were dispensary and Cook County Hospital patients, most of whom were grossly negligent concerning oral hygiene. Henrici and Hartzel believe, as was previously mentioned, that the "Mouth" streptococci produce, in metastatic infections and in experimentally inoculated animals, subacute and granulomatous lesions similar to the inflammatory reactions seen in pyorrhea and chronic apical abscesses. This may account for the fact that the strains of streptococci injected into the series of rabbits mentioned did not all prove fatal. It is to be noted that the virulence of the twenty-nine strains of hemolytic streptococci recorded here does not appear to be as high as that of the hemolytic streptococci harbored in the crypts of tonsils, adenoids and upon the pharyngeal mucous membrane. The latter are often highly virulent organisms. The possibility of some of the organisms from the crypts of the tonsils or from the pharyngeal mucous membrane becoming dislodged and subsequently finding their way to the gingival spaces to reside there merely as transients must, of course, be considered. If this were true the decreased virulence might be explained.

In the 144 patients examined nineteen or 13.1 per cent showed distinct clinical manifestations of pyorrhea. Of these, seven or 36.8 per cent, gave positive cultures for hemolytic streptococci (Table 5). Three were of the subacidus and four were of the anginosus varieties. Many of these individuals had other clinical manifestations, and it should be remembered that the majority were hospital cases..

Because of the great invasive power of the hemolytic streptococci it is highly probable that they can penetrate, not only the fibrous gingivae, but the alveolar periosteum as well. Here they can be taken up by the numerous lymph vessels and thence carried on into the blood stream producing metastatic lesions elsewhere. There is certainly a possibility that from this favorable habitat, in the deep dento-gingival spaces, the various hemolytic streptococci may at times act as secondary and terminal invaders.

Conclusions

The method of obtaining material for examination from the gingival spaces, as described, is advantageous because it is a clean, painless procedure and does not cause hemorrhage.

The data presented shows that 19.4 per cent of a series of 144 patients gave positive cultures of hemolytic streptococci in material taken from the dento-gingival spaces.

Of those patients with well defined clinical manifestations of pyorrhea 31.1 per cent gave positive cultures of hemolytic streptococci. Of these three strains were of the *Streptococci subacidus* and four of the *Streptococci anginosus* groups.

Hemolytic streptococcus were found between the teeth and gums in three out of fifteen cases of gingivitis.

Of the various strains of hemolytic streptococci found seventeen were streptococcus anginosus, five streptococcus subacidus, three streptococcus hemolyticus I, two streptococcus pyogenus, one was streptococcus infrequens and one was streptococcus hemolyticus III.

Of eleven strains selected at random, from twenty-nine strains of hemolytic streptococci isolated from the gingival spaces of patients, two proved to be fatal to rabbits in doses of 2cc of a broth culture. Both were of the anginosus type.

Because of the occurrence of hemolytic streptococci in the deep dento-gingival spaces, these spaces may be considered as potentially dangerous foci of infection.

There is a possibility that these organisms may from the above mentioned site act as secondary and

terminal invaders.

The fact that hemolytic streptococci were found in only a small proportion of the cases of pyorrhea examined and in these not in great numbers indicates that they are not the primary etiological factor in this condition.

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TABLE I

Incidence of hemolytic streptococci in the gingival space.

CASE NO	HEM STREP	PYORR HEA	GINGIV ITIS	DENT CARIES	BRIDGES, CROWNS, ETC	REMARKS
1	0	0	0	0	+	Wire brace
2		0	0	0	+	Tonsillitis
3	0	0	0	0	+	
4	0	0	0	0	+	
5	0	0	0	0		
6	+	0	+	+	+	Undergoing dental treatment
7	0	0	0	0	+	Chronic rhino- pharyngitis
8	0	0	0	+	+	Chronic rhinitis
9	0	0	0	+	+	Chronic rhinitis
10	0	0	0	0	+	
11	+	0	0	0	0	2 strains of strep. recovered
12	0	0	0	0	+	"Rheumatism"
13	0	0	0	0	0	
14	0	0	0	0	+	
15	0	0	0	+	0	
16	0	0	0	+	0	
17	0	0	0	0	+	
18	+	0	0	+	+	
19	+	0	0	+	+	
20	+	+	0	+	0	Chronic pharyn- gitis

CASE NO	HEM STREP	PYORR HEA	GINGIV ITIS	DENT CARIES	BRIDGES, CROWNS,&	REMARKS
21	+	+	0	+	+	
22	0	0	0	0	+	
23	0	0	+	+	+	
24	0	0	+	+	+	Lower plate
25	+	0	+	+	+	Neurasthenia
26	0	0	0	+	+	Upper plate-arterio- sclerosis
27	+	0	0	0	0	Tubotympanal catarrh
28	0	+	0	+	0	
29	0	0	+	+	0	Varicose ulcer
30	0	0	0	0	+	Chronic Septic arthritis
31	+	0	0	+	+	
32	0	0	0	+	+	Neuritis
33	0	0	0	0	0	
34	0	0	0	+	0	
35	0	0	0	0	0	
36	0	0	0	0	0	
37	0	0	0	0	0	
38	0	0	0	+	0	
39	0	0	0	0	0	
40	0	0	0	+	+	
41	0	0	0	+	+	
42	0	0	0	+	+	
43	0	0	0	+	+	
44	0	0	0	0	+	
45	0	0	0	+	+	Neuritis

CASE NO	HEM STREP	PYORR HEA	GINGIV ITIS	DENT CARIES	BRIDGES, CROWNS, &	REMARKS
46	0	0	0	+	0	Pulmonary T. B.
47	0	0	0	0	+	Chorea
48	0	0	0	+	+	Otitis media
49	+	0	0	+	0	
50	0	0	0	0	0	
51	0	0	0	+	0	
52	+	0	+	+	+	Undergoing dental treatment
53	0	0	0	0	0	
54	0	0	+	+	0	
55	0	0	0	+	0	Chronic laryngitis
56	+	0	0	0	0	Recurrent tonsillitis
57	0	0	0	+	+	Gonorrheal vaginitis
58	0	0	0	+	0	
59	0	0	0	+	0	Chronic pharyngitis
60	0	0	0	0	0	
61	0	0	0	0	0	Lues ?
62	0	0	0	0	0	Postoperat. adhesions
63	0	0	0	+	+	Aortitis
64	0	0	0	+	+	
65	0	0	0	+	+	
66	0	0	0	+	+	
67	0	0	0	0	+	
68	0	0	0	0	+	
69	0	0	0	+	+	Tubo-tympanal catarrh
70	0	0	0	+	+	Pharyngitis

CASE NO	HEM STREP	PYORR HEA	GINGIV ITIS	DENT CARIES	BRIDGES, CROWNS,&	REMARKS
71	0	0	+	+	+	
72	0	0	0	0	+	
73	0	0	0	0	+	
74	0	0	0	0	+	Undergoing dental treatment
75	0	0	0	+	0	Undergoing dental treatment
76	0	0	0	0	+	
77	0	0	0	0	0	
78	0	0	0	0	0	
79	0	0	0	+	0	
80	0	0	0	0	+	
81	0	0	0	+	+	Tabic Pareses
82	0	0	0	+	+	Multiple sclerosis
83	0	0	0	+	0	
84	0	0	0	+	0	
85	0	0	0	0	0	
86	0	0	0	0	0	
87	0	0	0	+	+	Struma
88	0	0	0	+	+	Myocarditis
89	0	0	+	+	+	Struma
90	0	0	0	+	+	Arthritis deformans
91	0	0	0	0	+	Chronic bronchitis
92	0	0	0	+	+	Neuritis
93	0	0	0	+	0	
94	0	0	+	+	+	Struma
95	0	+	0	+	+	

CASE NO	HEM STREP	PYORR HEA	GINGIV ITIS	DENT CARIES	BRIDGES, CROWNS,&	REMARKS
96	0	+	0	+	+	
97	0	0	0	0	+	
98	0	0	0	0	0	
99	+	0	0	0	0	
100	0	0	0	+	+	
101	0	0	0	+	0	
102	0	0	0	0	+	
103	+	0	0	+	0	Dental abrasion
104	0	0	0	+	0	
105	0	0	0	+	+	Lower plate
106	0	0	0	+	+	
107	+	+	0	+	0	
108	0	0	0	+	0	
109	+	+	0	+	0	
110	+	+	0	+	0	
111	+	+	0	+	+	
112	0	0	0	+	0	
113	0	0	0	+	+	
114	+	0	0	+	0	
115	+	0	0	0	+	
116	+	0	0	0	0	
117	+	0	0	+	+	
118	0	0	0	0	0	
119	0	+	0	+	0	
120	0	+	0	+	0	

CASE NO	HEM STREP	PYORR HEA	GINGIV ITIS	DENT CARIES	BRIDGES, CROWNS, &	REMARKS
121	0	0	0	+	+	
122	+	+	0	+	0	
123	0	+	0	+	+	Undergoing dental treatment
124	0	0	0	0	0	
125	0	+	0	+	0	
126	0	+	0	+	+	
127	0	0	0	+	+	Lower plate
128	0	0	+	+	+	
129	0	0	0	+	+	Mitral stenosis & regurgitation
130	0	+	0	+	0	Acute catarrhal jaundice
131	0	0	+	+	0	Carcinoma of Esophagus
132	0	0	0	+	0	Pulmonary tuberculosis
133	0	0	0	0	0	Cardiac decompensation
134	0	0	0	+	0	Auricular fibrillation
135	0	0	+	+	0	Gastric ulcer
136	+	0	0	0	0	Hypernephroma
137	+	0	0	0	0	Gastric ulcer
138	0	0	0	+	0	Pulmonary tuberculosis
139	+	0	+	0	0	Gonorrheal arthritis
140	0	0	0	0	0	Hydro-pneumo-thorax
141	0	0	+	+	+	
142	0	+	0	+	0	Chronic nephritis

CASE NO	HEM STREP	PYORR HEA	GINGIV ITIS	DENT CARIES	BRIDGES, CROWNS,&	REMARKS
143	0		0		0	Carcinoma of stomach
144	0		0		0	Lethargic encephalitis
TOTAL	28	19	15	91	74	Total
	or	or	or	or	or	
	19.4 per cent	13.1 per cent	10.4 per cent	63.1 per cent	51 per cent	

TABLE II

Classification of Hemolytic Streptococci

(Holman)

CASE NO	LACTOSE	MANNITE	SALICIN	VARIETY
2	+	0	0	Str. anginosus
6	0	0	0	Str. subacidus
7	+	0	0	Str. anginosus
11	0	+	0	Str. hemolyticus III
11B	+	0	0	Str. anginosus
18	+	0	0	"
19	+	0	0	"
20	0	0	0	Str. subacidus
21	+	0	0	Str. anginosus
25	+	0	0	Str. "
27	+	0	0	Str. "
31	+	0	0	"
49	+	0	+	Str. pyogenes
52	+	0	0	Str. anginosus
56	+	0	+	Str. pyogenes
99	0	0	0	Str. subacidus
103	+	+	0	Str. hemolyticus I
107	0	0	0	Str. subacidus
109	+	0	0	Str. anginosus

CASE NO	LACTOSE	MANNITE	SALICIN	VARIETY
110	+	0	0	Str. anginosus
111	+	0	0	"
114	+	0	0	"
115	+	+	0	Str. hemolyticus I
116	+	0	0	Str. anginosus
117	+	0	0	"
122	0	0	0	Str. subacidus
136	+	0	0	Str. anginosus
137	+	+	0	Str. hemolyticus I
139	+	+	+	Str. infrequens

TABLE III

Varieties of Hemolytic Streptococci

Variety of Hemolytic Streptococci	Number of Strains	Per Cent
Streptococci Anginosus	17	58.6
Streptococci Subacidus	5	17.2
Streptococci Hemolyticus I	3	10.3
Streptococci Pyogenes	2	6.8
Streptococci Hemolyticus III	1	3.4
Streptococci Infrequens	1	3.4
Streptococci Hemolyticus II	0	0
Streptococci Equi	0	0

TABLE IV

Virulence of gingival hemolytic streptococci for Rabbits

Rabbit No	Strain	Variety of Streptococci	Clinical Manifestations	Animal Inoculation
1	52	Str. anginosus	-	Multiple arthritis
2	19	"	-	Dead 14 days (cause undetermined)
3	27	"	-	Multiple arthritis
4	114	"	gonorrheal arthritis	Dead 10 days (Strep. Septicemia)
5	49	Str. pyogenes	-	No symptoms
6	20	Str. subacidus	pyorrhea-pharyngitis	" "
7	139	Str. infrequens	-	" "
8	18	Str. anginosus	-	" "
9	21	"	pyorrhea	" "
10	56	Str. pyogenes	tonsillitis	Arthritis
11	107	Str. subacidus	pyorrhea	No symptoms

TABLE V

Hemolytic Streptococci in Pyorrhea Cases.

CASE NO	HEM STREP	VARIETY OF HEM. STREP.	OTHER CLINICAL MANIFESTATIONS
20	+	Str. subacidus	Chronic pharyngitis
21	+	Str. anginosus	-
28	0	-	Varicose ulcer
95	0	-	-
96	0	-	-
107	+	Str. subacidus	-
109	+	Str. anginosus	-
110	+	"	-
111	+	"	-
119	0	-	-
120	0	-	-
122	+	Str. subacidus	-
123	0	-	-
125	0	-	-
126	0	-	-
130	0	-	Catarrhal jaundice
142	0	-	Chronic nephritis
143	0	-	Carcinoma of stomach
144	0	-	Lethargic encephalitis

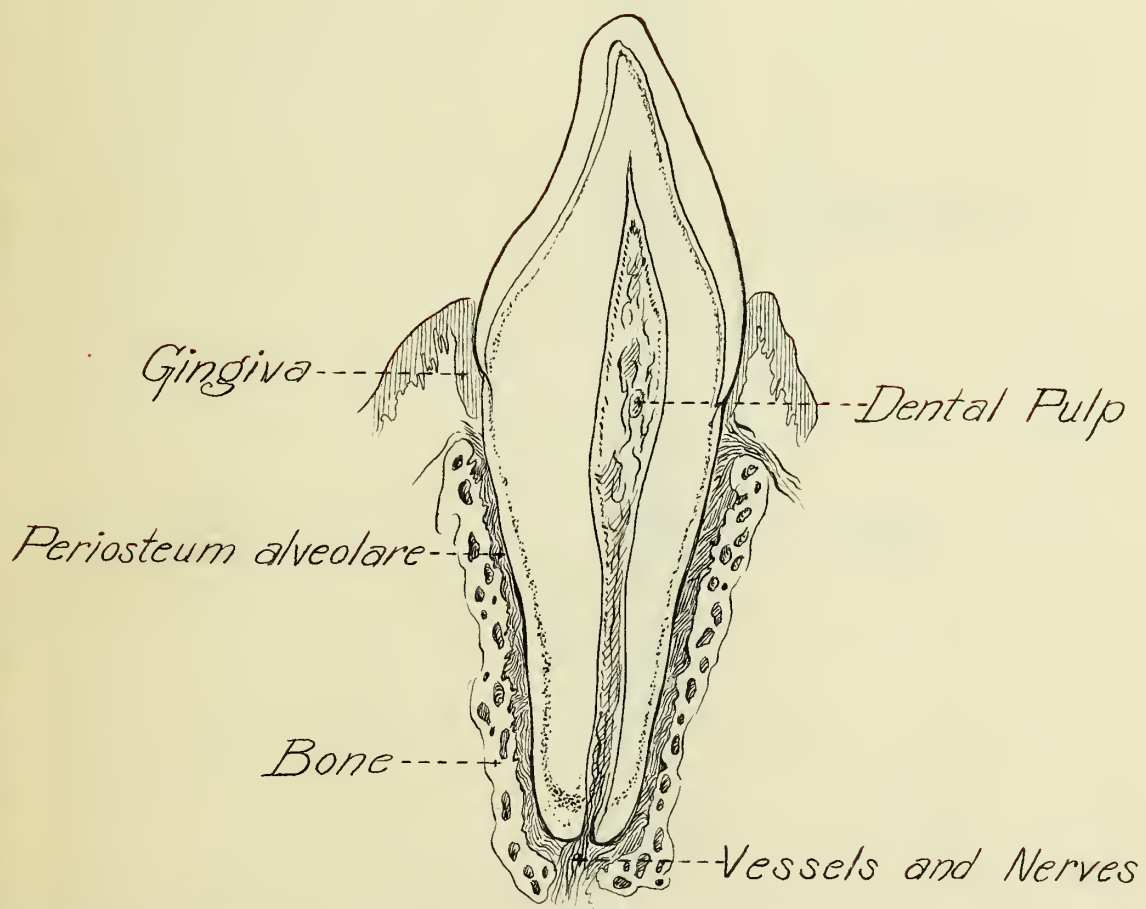
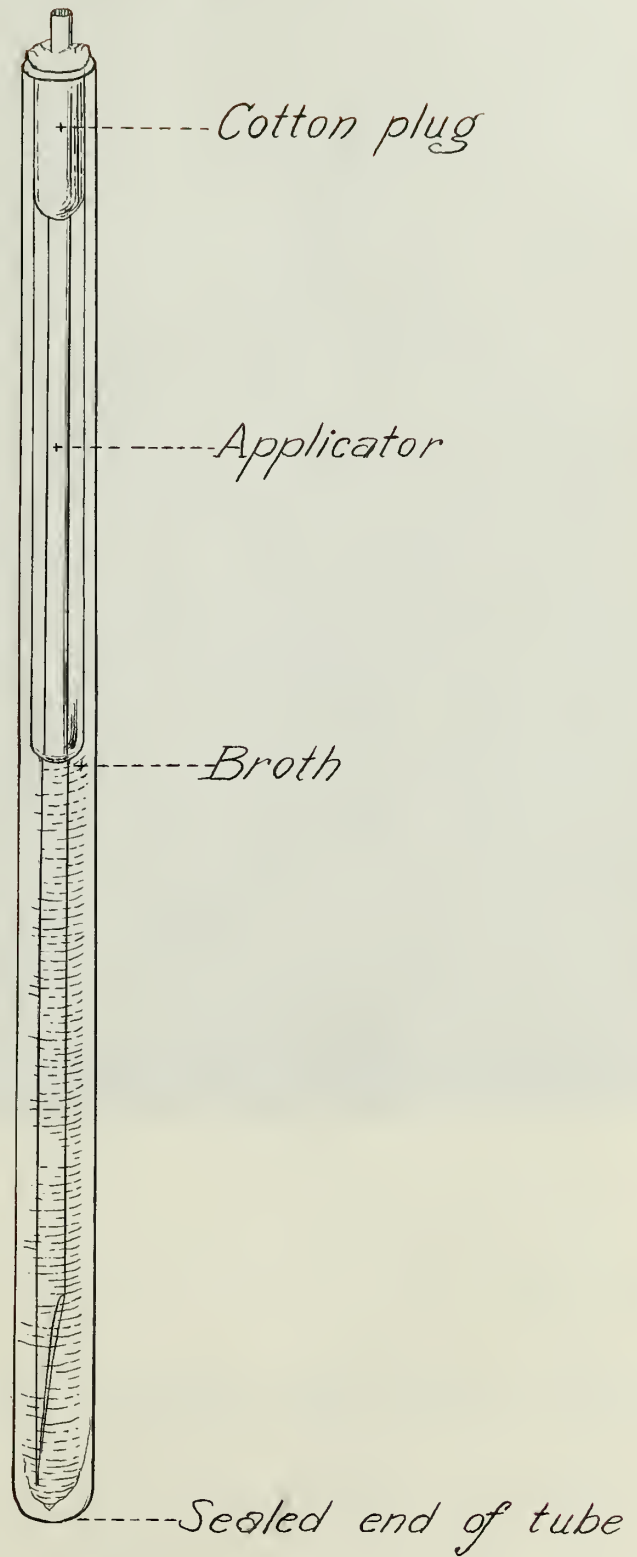


Figure 1- Gross Anatomy of Tooth & Gums



Figure 2- Showing tube of Serum broth containing sharpened
wooden applicator.



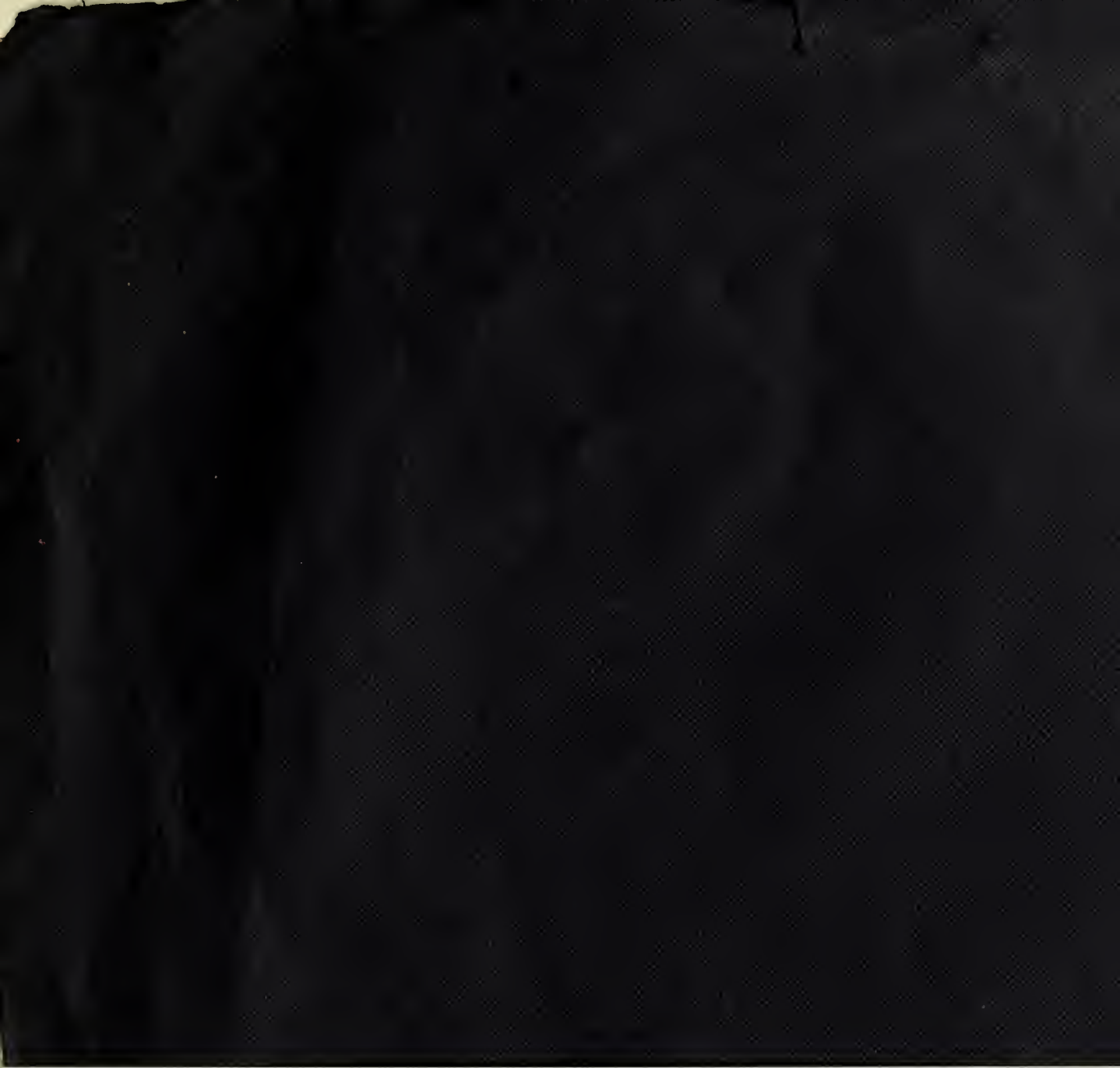


Figure 3 - Method of obtaining material from gingival space.



*Method of obtaining material
from gingival space*



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